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Evaluation of High School Students' Smartphone Addiction and Insomnia Level

Lise Öğrencilerin Akıllı Telefon Bağımlılığı ve Uykusuzluk Düzeyinin Değerlendirilmesi

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Abstract

Objective: To determine the frequency of smartphone addiction among high school students using smart phones and the severity of insomnia.
Materials and Methods: This cross-sectional study was performed between April and June 2019 and included high school students. The study group comprised a total of 745 high school students who used smartphones. Their smartphone addiction was analysed using the Smartphone Addiction scale-short form. The Insomnia Severity index was used to evaluate insomnia levels.
Results: According to the findings, 461 (61.9%) participants were female and 284 (38.1%) were male. The mean age was 15.76±0.90 years (range 14-18 years). The frequency of smartphone addiction was found to be 36.9% (n=275). The important risk factors for smartphone addiction were being a female, checking the smartphone 49 times or more in a day, using the smartphone for 5 h or more in a day, carrying a charger, spending time on the smartphone before falling asleep at night, checking the smartphone after waking up and having sleep problems. In our study, a weak positive correlation was observed between smartphone addiction and the severity of insomnia.
Conclusion: In this study, smartphone addiction was determined to be an important health problem among high school students. There was a weak positive correlation between smartphone addiction and the severity of insomnia. To reduce smartphone addiction, students, parents and teachers should be informed about the misuse of smartphones.
Keywords: Smartphones, insomnia, high school students

Öz

Amaç: Bu çalışmanın amacı, akıllı telefon kullanan lise öğrencileri arasında akıllı telefon bağımlılığı sıklığının saptanması ve uykusuzluk şiddetinin belirlenmesidir.
Gereç ve Yöntem: Bu çalışma, Nisan-Haziran 2019 tarihleri arasında lise öğrencileri üzerinde gerçekleştirilen kesitsel tipte bir araştırmadır. Çalışma kapsamına alınan liselerde öğrenim görmekte olan ve akıllı telefon kullanan toplam 745 öğrenci çalışma grubunu oluşturmuştur. Öğrencilerin akıllı telefon bağımlılığı, Akıllı Telefon Bağımlılığı ölçeği-kısa formu ile değerlendirilmiştir. Uykusuzluk düzeyinin değerlendirilmesi için ise Uykusuzluk Şiddeti indeksi kullanılmıştır.
Bulgular: Çalışma grubunu oluşturanların 461'i (%61,9) kadın, 284'ü (%38,1) ise erkektir. Yaşları 14-18 arasında değişmekte olup, ortalama 15,76±0,90 yıl idi. Bu çalışmada akıllı telefon bağımlılığı sıklığı %36,9 (n=275) olarak saptanmıştır. Akıllı telefon bağımlılığı için önemli risk faktörleri arasında kadın olmak, bir günde akıllı telefonu kontrol etme sayısının 49 kez ve üzerinde olması, bir günde akıllı telefon kullanma süresinin 5 saat ve üzerinde olması, yanında şarj cihazı taşımak, gece uyumadan önce akıllı telefonla zaman geçirilmesi, uyandıktan sonra akıllı telefonun kontrol edilmesi ve uyku sorunu yaşamak olduğu görülmüştür. Çalışmamızda akıllı telefon bağımlılığı ile uykusuzluk şiddeti arasında pozitif yönde zayıf bir ilişki olduğu saptanmıştır.
Sonuç: Bu çalışmada lise öğrencileri arasında akıllı telefon bağımlılığının önemli bir sağlık sorunu olduğu saptanmıştır. Akıllı telefon bağımlılığı ile uykusuzluk şiddeti arasında pozitif yönde zayıf bir ilişki vardır. Akıllı telefon bağımlılığının azaltılması için akıllı telefonların amaç dışı kullanılmaması konusunda öğrencilere, velilere ve öğretmenlere bilgilendirme çalışmalarının yapılması yararlı olacaktır.
Anahtar Kelimeler: Akıllı telefon, uykusuzluk, lise öğrenci

Introduction

The use of technology has been increasing rapidly especially among young people in recent years, and it can reshape the lifestyle of children and adolescents (1). Adolescence, which has an important place in the developmental periods of human beings, is a period in which individuals search for identity, they go through emotional changes, and friendship and social environment are important (2). Factors such as emotional

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problems, the need for socialization, and the search for identity can make technology an attractive tool for adolescents. Excessive use of technology that starts with these feelings and thoughts can turn into a problem by adversely affecting the social and psychological world of the individual and leading to undesirable consequences and deterioration in important life areas (3,4). Adolescence is a period when risky behaviors are inevitable and is considered as a critical stage in terms of technological addictions such as internet addiction, social media addiction, digital game addiction, and smartphone addiction. Also, the use of technologies such as the internet, social media, smartphone, and digital games is more common among adolescents. This situation can make adolescents more vulnerable to technology addiction (5).

In adolescence, sleep routine is very important, and poor or inadequate sleep affects growth and development negatively (6). However, sleep disorders are known to increase in school-age children, and this problem gets even worse with age (7). There is an inverse relationship between sleep time and age (8). In addition to inadequate sleep time, problems related to poor sleep have also increased in adolescents (9). Many factors affect the duration and quality of sleep in adolescents negatively. Among these factors, increased use of smartphones and addiction to these devices particularly stand out. In addition to communication, smartphones are also used for surfing the internet, accessing social networks, taking photos, shopping, sending emails, listening to music, playing games, getting traffic information, and navigation (10,11). These behaviors are shown to cause short and poor night sleep among adolescents who are addicted to mobile phones (12).

This study was carried out to determine the frequency of smartphone addiction among high school students using smartphones and the severity of insomnia, and to analyze some variables that are thought to be associated with the issue.

Materials and Methods

This study used a cross-sectional research design and was conducted on high school students using smartphones between April and June 2019.

At the outset, approval of Dokuz Eylül University non-interventional Research Ethics Committee with issue 2019/01-60 was obtained. To collect the data, necessary permissions were obtained from the District National Education Directorates, related school administrations, students, and parents.

The study group consisted of 9th, 10th, 11th, and 12th-grade students enrolled in Muzaffer Çil Anatolian High School and İzmir İnönü Anatolian High School. There were a total of 1.552 students in these two schools including 600 in Eskişehir Muzaffer Çil Anatolian High School and 952 in İzmir İnönü Anatolian High School. In the study, we aimed to reach all of the students, but a total of 745 students who were at school during the study process and agreed to participate in the study made up the study group.

In the study, a questionnaire form was designed in light of the literature. The questionnaire included questions about some socio-demographic characteristics of students, some variables that were thought to be associated with smartphone addiction, and the questions of the Smartphone Addiction scale and the Insomnia Severity index.

The date and time of the interviews for data collection were determined by contacting the school administrators in advance. The researcher went to the schools on the pre-determined days and hours and checked the study group. After explaining the purpose and subject of the study to the students, verbal consent was obtained from those who agreed to participate in the study, and the questionnaire forms were handed out to the students. The students filled out the forms under observation. This process took nearly 15-20 minutes. Students who were absent during the data collection process or who did not agree to participate in the study were not included in the study.

In this study, students' smartphone addiction was evaluated using the Smartphone Addiction scale-short form. The scale was developed by Kwon et al. (13) in 2013 to measure the risk of smartphone addiction in adolescents. The validity and reliability study of the scale in Turkey was conducted by Noyan et al. (14) in 2015. Cronbach's alpha value of the scale was calculated as 0.867. The scale consists of ten 6-point Likert-type questions, and the questions are scored from 1 to 6. The scores that can be obtained from the scale vary between 10 and 60, and high scores are considered to show an increased risk for addiction. Males with a score of 31 or greater and females with a score of 33 or greater are interpreted as "smartphone addicts".

The insomnia levels of the students were analyzed with the Insomnia Severity index. The scale was developed by Bastien et al. (15). The validity and reliability study was conducted by Boysan et al. (16) and Cronbach's alpha value was calculated as 0.79 (16). Each item on the seven-item 5-point Likert-type scale is scored between 0 and 4, and the total score that can be obtained from the scale varies between 0 and 28. As the score obtained from the scale increases, the severity of insomnia is considered to increase, as well.

In this study, family income status was evaluated as "good", "moderate", and "bad" according to the students' own perceptions.

Research questions are;

High school students'

1. Are they addicted to smartphone addiction?
2. What are the independent variables (socio-demographic features, smartphone usage features, sleep characteristic) associated with high school students' smartphone addiction?
3. What are the risk factors for smartphone addiction?

Statistical Analysis

The data obtained were analyzed on the Statistical Software Package. For analyses, chi-square test, Logistic Regression Analysis (Backward Wald), and Spearman's correlation analysis were used. The statistical significance was accepted as $p \leq 0.05$.

Results

According to the findings, 461 (61.9%) of the participants were female and 284 (38.1%) were male. The mean age was 15.76±0.90 years ranging between 14 and 18. The frequency

of smartphone addiction among students was determined as 36.9% (n=275). Table 1 presents the distribution of the participants with and without smartphone addiction by some socio-demographic characteristics.

The mean length of having a smartphone in the study group was found to be 3.88±1.75 years ranging between 1 and 12 years. The mean smartphone use of the students a day was 4.33±2.62 ranging between 1 and 17 hours. The mean daily sleep time was 7.49±1.15 hours which varied between 4 and 11 hours. The number of participants carrying chargers was 201 (27.0%), and the number of those who had sleep problems was 211 (28.3%). Table 2 gives the distribution of the students diagnosed with or without smartphone addiction by some characteristics considered to be associated with smartphone addiction.

Table 3 gives the results of the logistic regression analysis (backward wald) conducted on variables considered to be associated with smartphone addiction (number of daily smartphone checks, duration of daily smartphone use, carrying a charger, spending time on the smartphone before falling asleep at night, checking the smartphone after waking up, history of sleep problems, and daily sleep time). In our study, the students were found to use the smartphone most frequently for social media with 21.6% and least frequently for mobile applications with 8.0%. The reasons for smartphone use in the study group are given in Table 4.

The mean score obtained from the Smartphone Addiction scale was 28.86±10.94, which ranged between 10 and 60, and the mean score obtained from the Insomnia Severity index was 7.97±4.96, which varied from 0 to 26. A weak positive correlation was found between the scores that students obtained from the Insomnia Severity index and the scores they obtained from the Smartphone Addiction scale (r=0.319, p=0.000). The distribution of the scores obtained by the study group from the Insomnia Severity index and the Smartphone Addiction scale is shown in Chart 1 and Table 5.

Discussion

In recent years, there has been an increase in smartphone addiction and insomnia problems among high school students and it has become an important public health problem. In this study, the frequency of smartphone addiction and the severity of insomnia among high school students using smartphones in İzmir and Eskişehir provinces were discussed in line with the literature.

Our study showed that students spent an average of 5 hours or more a day on mobile phones. They were determined to use the smartphone most frequently for social media with 21.6% and least frequently for mobile applications with 8.0%.

According to the 2018 "ICT usage survey in households" data of the Turkish Statistical Institute, internet use was 59.6% among individuals aged 16 in Turkey. According to this report, the rate of social media use ranks first among the reasons for internet use (17).

In the present study, smartphone addiction among students was found to be 36.9%. Different results have been found in studies conducted in different countries. For example, in their study on medical students in Eastern Nepal, Thapa et al. (18) found it as 21.8%; in their study on university students in China, Bian and Leung (19) found the value as 13.6%; another study on college students in England by Lopez-Fernandez et al. (20) found it as 10.0%; Smetaniuk (21) determined this value as 25.0% on college students in America; in their study on adolescents in Switzerland, Haug et al. (22) found it as 16.9%; Chen et al. (23) determined it as 29.8 in a study on medical students in China; Nowreen found it as 34.4% in a study on medical students in India.

Table 1. The distribution of the participants with and without smartphone addiction by some socio-demographic characteristics

Socio-demographic characteristics	Smartphone addiction		Test value χ^2, p
	No n=470 (63.1)	Yes n=275 (36.9)	
	n (%)*	n (%)*	
School			
Muzaffer Çil Anatolian high school	213 (45.3)	159 (57.8)	11,968, 0.003
İnönü Anatolian high school	257 (54.7)	116 (42.2)	
Age groups			
≤15	211 (44.9)	127 (46.1)	2.396, 0.302
16	141 (30.0)	92 (33.5)	
≥17	118 (25.1)	56 (20.4)	
Gender			
Female	274 (58.3)	187 (68.0)	6.923, 0.009
Male	196 (41.7)	88 (32.0)	
Family income			
Good	68 (14.5)	57 (20.7)	4.868, 0.027
Moderate-bad	402 (85.5)	218 (79.3)	

Table 2. The distribution of the students diagnosed with or without smartphone addiction by some characteristics considered to be associated with smartphone addiction			
Some characteristics associated with smartphone addiction	**Smartphone addiction**		**Test value χ^2, p**
	No n=475 (63.1)	**Yes n=275 (36.9)**	
	n (%)*	**n (%)***	
Number of daily smartphone checks			
1-16 times	130 (27.7)	23 (8.4)	**72,027, 0.000**
17-32 times	172 (36.6)	79 (28.7)	
33-48 times	112 (23.8)	88 (32.0)	
≥49	56 (11.9)	85 (30.9)	
Duration of daily smartphone use (hours)			
≤2	140 (29.8)	27 (9.8)	**57,002, 0.000**
3-4	201 (42.8)	109 (39.6)	
≥5	129 (27.4)	139 (50.6)	
Carrying a charger			
Yes	84 (17.9)	117 (42.5)	**53,609, 0.000**
No	386 (82.1)	158 (57.5)	
Spending time on the smartphone before falling asleep at night			
Yes	347 (73.8)	252 (91.6)	**34,911, 0.00**
No	123 (26.2)	23 (8.4)	
Checking the smartphone after waking up			
Yes	220 (46.8)	218 (79.3)	**75,472, 0.000**
No	250 (53.2)	57 (20.7)	
History of sleep problems			
Yes (insufficient, poor quality sleep, difficulty falling asleep)	99 (21.1)	112 (40.7)	**23,043, 0.000**
No	371 (78.9)	163 (59.3)	
Daily sleep time (hours)			
≤6	72 (15.3)	60 (21.8)	**8.595, 0.035**
7	134 (28.5)	89 (32.4)	
8	192 (40.9)	93 (33.8)	
≥9	72 (15.3)	33 (12.0)	

Table 3. The results of the logistic regression model (backward wald) established based on variables considered to be associated with smartphone addiction in the study group (final step: 5)					
Variables	**ß**	**SE[a]**	**p**	**OR[b]**	**95% CI[c]**
Number of daily smartphone checks (reference: 1 hour)					
17-32 times	0.299	0.300	0.318	1.349	0.749-2.428
33-48 times	0.418	0.313	0.182	1.519	0.823-2.805
≥49	0.918	0.339	0.007	2.503	1.287-4.868
Duration of daily smartphone use (reference: ≤2 hours)					
3-4	0.620	0.275	0.024	1.859	1.085-3.187
≥5	0.963	0.287	0.001	2.621	1.492-4.602
Carrying a charger					
Yes	0.882	0.192	0.000	2.415	1.658-3.518
Spending time on the smartphone before falling asleep at night					
Yes	0.634	0.277	0.022	1.886	1.096-3.243
Checking the smartphone after waking up					
Yes	1.087	0.198	0.000	2.965	2.011-4.371
History of sleep problems					
Yes	0.780	0.192	0.000	2.182	1.499-3.178
Constant	-4.100	0.427	0.000	-	-
SE[a]: Standard error, OR[b] : Odd's ratio, CI[c]: Confidence interval					

Table 4. The reasons of the students in the study group for smartphone use		
The reasons for smartphone use	**Number***	**Percentage**
Talking	411	14.2
Texting	588	20.3
Playing games	291	10.0
Social media	627	21.6
Mobile applications	232	8.0
Taking photos	283	9.7
Search for information/doing homework	423	14.6
Other	47	1.6
Total	2.902	100.0
*The numbers refer to the number of reasons, not persons		

Table 5. Correlation analysis between insomnia severity index and the smartphone addiction scale		
	Smartphone addiction	**Insomnia Severity index**
Smartphone addiction r p	 1.000 .	 0.319 0.000
Insomnia Severity index r p	 . .	 1.000 .

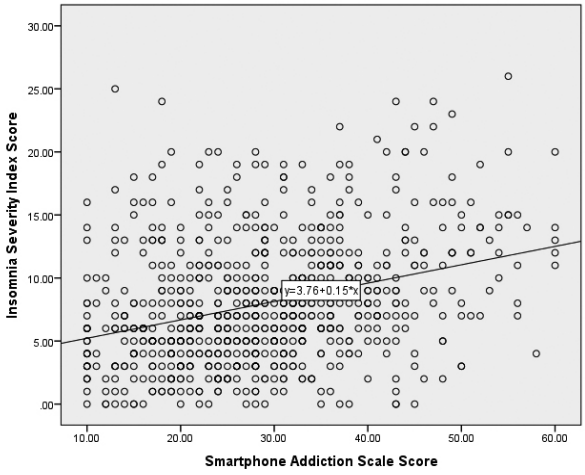

Chart 1. The distribution of the scores obtained by the study group from the Insomnia Severity index and the Smartphone Addiction scale

Smartphone addiction was found higher among Muzaffer Çil Anatolian High School students compared to that of other high school students. However, the result of the logistic regression analysis indicated that there was no difference between schools in terms of smartphone addiction. This may have resulted from the fact that the students enrolled in the study from two different cities had similar socio-economic levels and that the high schools they were attending were similar in terms of the region where they were located, qualifications, and characteristics.

There was no difference between age groups in terms of smartphone addiction, either. This might have been because the age of the students was close to each other.

Smartphone addiction was found to be higher among females than males. As a result of the logistic regression analysis, the difference between males and females was observed to disappear. These findings were consistent with the findings of previous studies on students (1,11,22). This situation can be explained by the acceptance of commitment within the scope of social values for females and the attribution of this commitment to a tool.

The frequency of smartphone addiction was found to be higher among the participants with good family income.

In the study, as the number of daily smartphone checks increased, the frequency of smartphone addiction was determined to increase, as well. As a result of the logistic regression analysis, the frequency of smartphone addiction was observed to be 2.503 times higher in those who checked their smartphone 49 times a day or more. Pavithra and Madhukumar (24) stated in their study that the behavior and habit of checking the screen was one of the characteristic features of mobile phone addiction and smartphone addiction.

Students' frequency of smartphone addiction increased as their daily smartphone screen time increased. As a result of the logistic regression analysis, the duration of daily smartphone use for 5 hours or more was found to be an important risk factor for smartphone addiction.

The frequency of smartphone addiction was found to be higher in students in the study group carrying a charger. The result of the logistic regression analysis indicated that the frequency of smartphone addiction was 2.415 times higher among those

carrying a charger. In their study, Pavithra and Madhukumar (24) found results similar to the findings of our study. Running out of the battery of the smartphone is a situation that leads to concerns in individuals with smartphone addiction. To avoid this situation, these individuals constantly try to keep their smartphones on and in range. Given that the small size and lightweight body of these devices facilitate their portability today, it is an expected outcome that individuals who are at risk of smartphone addiction carry a charger.

Features related to mobile phone use and smartphone addiction are also important factors related to sleep quality. Some studies in the literature investigate the relationship between smartphone addiction and sleep quality (11,25). The cause-effect relationship between smartphone addiction and sleep quality is not fully known; yet, the following negative consequences are thought to show up: excessive smartphone use result in stimulating effect; exposure to excess stimulants just before falling asleep due to smartphone use leads to difficulty falling asleep and sleep disruptions; the reduction of melatonin hormone release due to the exposure to the smartphone screen light delays the circadian rhythm; curiosity raised due to social media use through smartphone results in sleep disruptions (26,27). In our study, the frequency of smartphone addiction was found to be higher among students whose daily sleep time was less than 6 hours. Also, smartphone addiction was determined to be higher in those who spent time on the smartphone before falling asleep at night, checked smartphone after waking up, and had sleep disorders.

In our study, a weak positive correlation was found between the scores students obtained from the Insomnia Severity index and the Smart Phone Addiction scale. The results were found to support the findings that the students had sleep problems. In a study investigating the relationship between sleep quality and smartphone addiction in university students, Özcan (28) reported that 64.5% of the students with smartphone addiction had poor sleep quality, but that this rate was 45.9% in those who did not have the addiction. Similar to our study, a significant positive correlation was found between the Pittsburgh Sleep Quality index total score and Smartphone Addiction scale-short form scores (28). A study in the literature stated that prolonged smartphone use caused sleep disorders and also an increase in conditions such as fatigue and sleep deprivation due to exposure to bright light (29).

Study Limitations

The use of cross-sectional research design, the small number of schools included in the study, and the lack of objective diagnostic methods were among the limitations of the current study. Another limitation of the study was that some of the informed consent forms sent to parents through students was not handed over to parents or returned to researchers. For this reason, researchers often went to the schools and tried to send the forms to parents through students. This resulted in losses in the sample and extra time and cost for researchers to reach the targeted number of students.

Conclusion

In this study, smartphone addiction was found to be an important health problem among high school students. Important risk factors for smartphone addiction was observed to include being a female, daily smartphone checks 49 times or more, daily time of smartphone use that is 5 hours or more, carrying a charger, spending time on the smartphone before falling asleep at night, screen checks after waking up, and having sleep problems. The students were found to use the smartphone most frequently for social media and least frequently for mobile applications. In our study, a weak positive correlation was found between smartphone addiction and insomnia severity. Carrying out programs for informing students, parents, and teachers about the misuse of smartphones to reduce smartphone addiction will be beneficial. More comprehensive studies are needed to reveal the relationship between smartphone addiction and insomnia.

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Ethics

Ethics Committee Approval: At the outset, approval of Dokuz Eylül University Non-interventional Research Ethics Committee with issue 2019/01-60 was obtained.

Informed Consent: The study was that some of the informed consent forms sent to parents through students was not handed over to parents or returned to researchers.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Concept: Ö.Ç., Design: Ö.Ç., Data Collection or Processing: Ö.Ç., B.K., Analysis or Interpretation: Ö.Ç., B.K., Literature Search: Ö.Ç., Writing: Ö.Ç.

Conflict of Interest: No conflict of interest was declared by the authors.

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